Psychological Reports, 1978, 43, 779-782. © Psychological Reports 1978

ACTIVITY AND ACQUISITION/EXTINCTION COMPARISONS OF BROWN- AND WHITE-COATED LITTER MATES

JANE LUNDGREN[1] AND MICHAEL A. PERSINGER

Laurentian University[2]

Summary.—Initial experiments were conducted to determine the effect of coat color on behavior. "Wild" brown- and white (albino)-coated litter mates from 5 brother-sister bred pairs which were the offsprings of albino rats bred with wild dump rats (*Rattus norvegicus*) were compared directly on several behavioral measures. No significant differences existed between coat colors for juvenile and adult ambulatory activity, acquisition rates for a lever-pressing task or for weaning and adult body weights. The brown-coated rats extinguished the lever responses more quickly than their white-coated litter mates. Sex differences tended towards significance for the activity measures and were significant for the body weights.

With the exception of obvious pigment-related differences such as visual acuity, few behavioral comparisons have been made between rats displaying brown coats and white or albino coats. Direct comparisons have been limited since any differences observed could be considered consequences of litter variables or differential reinforcement histories. While investigating the behavioral correlates of albino-wild brown rat breeding (Lundgren, 1977), we noted that, when the offsprings of wild dump rats (*Rattus norvegicus*) and Wistar albino rats were bred together (brother-sister), both brown and albino rats were born within the same litters. Although nothing new in principle, the occurrence of brown- and albino-coated rats within the same litter allowed direct comparison of rats that *presumably* share very similar prenatal and preweaning histories. In this experiment, we determined if any gross differences in ambulatory activity, lever-press acquisition or extinction existed between rats with brown coats and their albino litter mates.

METHOD

Subjects

Seven male albino, 9 male brown, 7 female albino and 14 female brown rats from 5 litters were tested in various tasks at 30—32, 60—62, and 75—79 days of age.

Procedure

Breeding and rearing of subjects.—Brother-sister pairs (with wild brown coats) from five different litters, all consequences of albino by wild rat matings, were bred. The pregnant females were then housed singly in plastic cages

[1]Now at Department of Psychology, University of Western Ontario, London, Ontario.
[2]Behavioral Neurobiology Lab, Department of Psychology, Laurentian University, Sudbury, Ontario, Canada P3E 2C6.

containing corncob bedding. Since coat color was not evident at birth, litters of these females were not culled to 8 pups until postnatal day 7. At this time, only all brown or all white pups were saved while combination colors, e.g., black and white, were eliminated; attempts were made to save equal numbers of albino and brown pups when possible. After weaning at 21 days of age, the rats were weighed and housed in pairs of the same sex for the remainder of the experiment in 41-cm × 25-cm × 18-cm wire cages. To attenuate possible coat-related dominance of food/water, equal numbers of rats were housed with either a same-color or different-color- litter mate. Throughout the experiment, the following colony conditions existed: light:dark 12:12 hr., temperature 22° ± 1°C; humidity 40 ± 5%, and background noise 70 ± 2 db.

Activity tests.—Beginning at 30 days and 60 days of age, each rat was tested individually for 4 min./day for 3 consecutive days in one of two plastic 46-cm × 20-cm × 14-cm activity cages. Activity was determined by two pairs of photocells equally spaced along the length of the cage. Following completion of each rat's test, the cage was washed with 1% acetic acid and dried. Light intensity on the cages' floors from overhead fluorescent lighting was 60 lx. Temperature and noise levels were within normal ranges of the colony room. The median number of activity counts over the 3-day test periods were used as each animal's activity scores. Since the 5 litters were born at different times, testing occurred over two 7-day periods.

Operant training.—At 70 days of age, rats were placed upon a 23.5-hr. food deprivation schedule until the end of the experiment. Five days later, each subject was given two 30-min. acquisition sessions for a lever-pressing response (continuous reinforcement) in one of two single-lever Lafayette operant chambers. Criterion was 50 responses (reinforcements) per day or a total of 100 reinforcements for the two days. The time required to achieve criterion was recorded for each subject. If the subject had not reached criterion by the end of the second session, it was given an acquisition time of 60 min. After the two days of acquisition, the subjects were then exposed to three consecutive daily 30-min. extinction sessions. The median number of responses emitted during this period was used as the rat's extinction score. Two-way analyses of variance (sex by coat color), means and standard deviations were completed by computer using statistical packages.

RESULTS

The means and standard deviations for juvenile (30—32 days old) and adult (60—62 days old) activity measures, weaning body weight, 60-day-old body weight, responses on the first day of acquisition, total responses during acquisition, time to criterion, number of responses during extinction, and deprivation body weights are presented in Table 1 according to main effects of coat color and sex. There were no significant interactions. Two-way analyses

of variance indicated significant sex differences for the 60-day-old body weights ($F = 200.90$, $df = 1/33$, $p < .001$) and for deprivation body weights ($F = 141.8$, $p < .001$) only. A trend towards significance was evident for 30- and 60-day-old activity counts ($F = 3.41$, $F = 3.20$, $df = 1/33$, $p < .10$). All other sex differences demonstrated no evidence of statistical significance. Significant differences in coat color existed only for the median number of extinction responses ($F = 7.42$, $df = 1/33$, $p < .01$); all other differences were nonsignificant.

TABLE 1

MEANS AND STANDARD DEVIATIONS (±) FOR VARIOUS BEHAVIORAL AND BODY-WEIGHT MEASURES AS A FUNCTION OF MAIN EFFECTS: COAT COLOR AND SEX

Measure	Coat Color		Sex	
	Albino ($n = 14$)	Brown ($n = 23$)	Male ($n = 16$)	Female ($n = 21$)
Juvenile Activity (counts)	33.4±17.7	31.2±19.4	24.5±16.4	37.8±18.3
Adult Activity (counts)	26.1±15.8	35.9±20.8	26.1±17.0	36.8±20.2
Day 1 Acquisition S+s	36.0±21.6	30.2±15.9	31.5±21.1	32.8±15.7
Total Acquisition S+s	89.7±15.6	89.0±17.4	91.2±17.1	87.8±16.4
Time to Criterion (min.)	52.4±12.8	56.9±10.6	53.2±12.9	57.0±10.3
Extinction Responses	28.7±15.2[a]	15.7±15.8[b]	14.8±11.5	24.2±18.8
Body Weight				
21 day	46.6± 4.8	47.3± 2.8	48.1± 3.7	46.3± 3.5
60 day	214.1±45.5	201.1±43.1	252.1±21.2[a]	170.9±11.7[c]
Deprivation	195.5±47.6	180.6±44.7	231.9±22.0[a]	149.8±17.0[c]

[ab] $p < .01$. [ac] $p < .001$.

DISCUSSION

Only significant differences in the number of responses displayed during lever-press extinction differentiated brown-coated rats from their white-coated (albino) litter mates. Coat color did not appear to influence juvenile activity, adult activity, acquisition rates, or acquisition times in any significant manner. Quicker extinction of brown-coated rats relative to albino rats has been observed also by Millar (1972) who compared wild rats with domestic ones. However, his study was confounded by the extreme savageness of the wild rats that resulted in differential handling of two groups. In the present study, the brown- and white-coated rats had been selected from the same litters and did not have any gross differential handling histories. Why brown-coated rats should extinguish more quickly than albino rats is not clear.

The reliability of the extinction differences is suggested since litters were not extinguished on the same days given their different birthdates and were tested over a seven-day period. In addition, the tendency for less ambulatory activity by the male rats relative to female rats is typical of many other studies

(e.g., Persinger, 1969) using such animals. Acquisition time and body weights were well within the absolute range displayed by normal albino rats tested in this laboratory.

REFERENCES

LUNDGREN, J. Hybrid (wild-albino) and albino rats exposed to postnatal handling: behavioral and physiological changes. Unpublished 4th year thesis, Laurentian Univer., 1977.

MILLAR, R. Comparison of wild and domestic *Rattus norvegicus* on variable interval reinforcement, discrimination and discrimination reversal. Unpublished doctoral dissertation, Univer. of Missouri, 1972.

PERSINGER, M. A. Open-field behavior in rats exposed prenatally to a low intensity-low frequency rotating magnetic field. *Developmental Psychobiology*, 1969, 2, 168-171.

Accepted August 27, 1978.